OPERATION MANUAL
MANUAL DE OPERACION

CASIO ML-90

Dear customer,

Thank you very much for purchasing our unique electronic product with 12 pre-programmed tunes.
To utilize its comprehensive features please read through this booklet and become familiar with its many abilities.

* *It is recommended that the mode selection switch be set to "TIME" while carrying around this unit to keep regular time display.*

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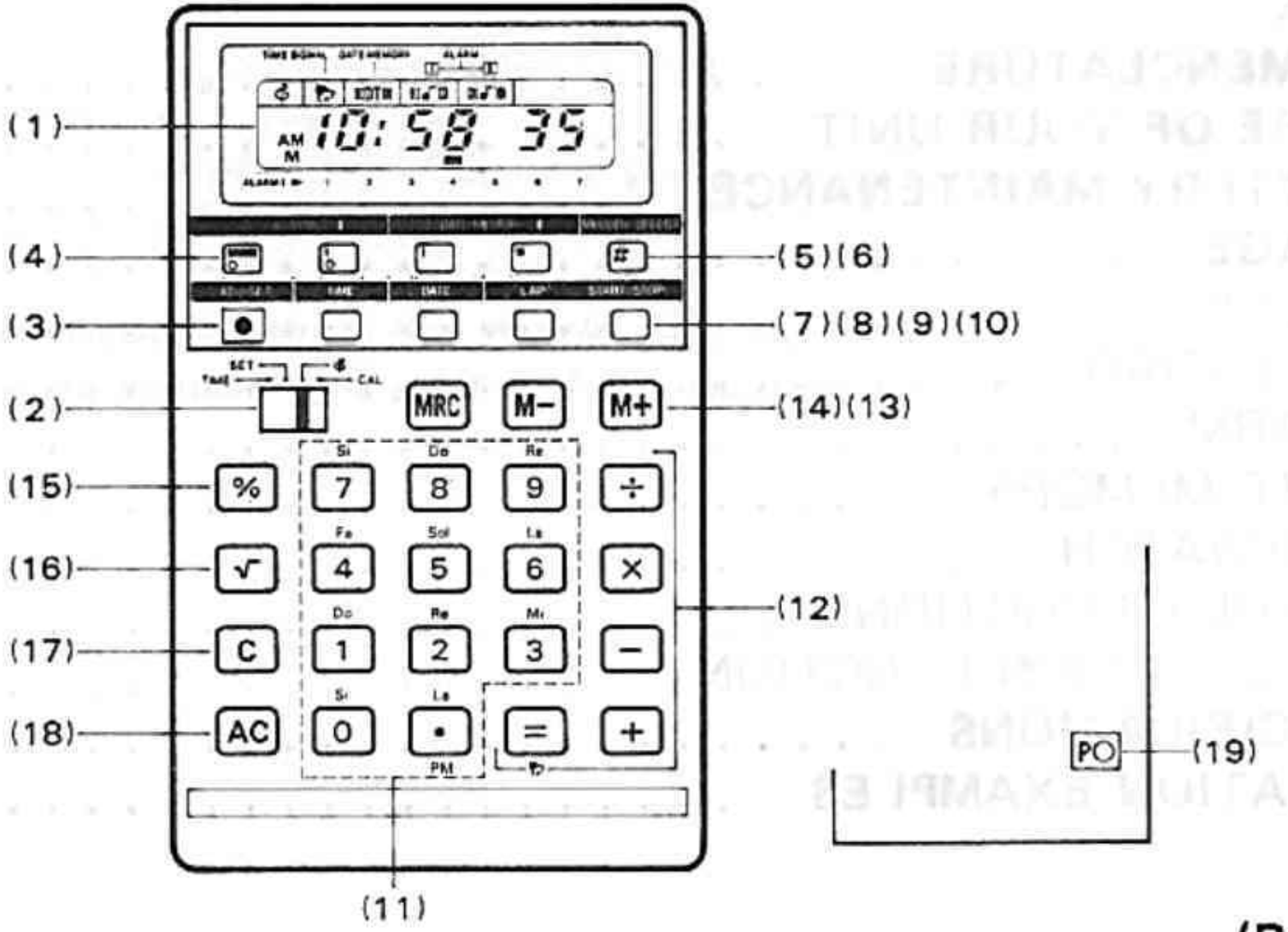
1 NOMENCLATURE



(Back side)

(1) Read-out

(2) Mode selection switch (Hereinafter called "switch")

TIME: Time is continuously displayed.
SET: To set daily alarms, date memories and hourly time signals
♪: To activate musical functions (manual or pre-programmed melody playing).
CAL or ♪: To perform calculations
SET, ♪ or CAL: To set time and date
TIME, SET, ♪ or CAL: Hourly time signal is given every hour on the hour.

(3) ADJ/SET ○ Set button

Sets time and date.
It is also used for adjusting time in seconds.

(4) ALARM I / ALARM II Alarm-1/Alarm-2 keys (Symbolized here as AL-I / AL-II)

Set alarm-1 and alarm-2.
Retrieves time preset for each alarm when pressed after the AC key.

(5) DATE MEMORY I / DATE MEMORY II Date memory-1/Date memory-2 keys (Symbolized here as DM-I / DM-II)

Set date memory-1 and date memory-2.
Retrieves date preset for each date memory when pressed after the AC key.

(6) MELODY SELECT (#) Melody selection key (Symbolized here as (#))

Selects a melody from alarm-1 for repeat everyday.
Activates buzzer sound for alarm-1 or alarm-2.
Selects a melody of date memory-2.

(7) TIME Time key

Displays regular time.

(8) DATE Date key

Displays date.

(9) LAP Lap key

Measures individual lap times while stopwatch is functioning.
Retrieves stopwatch mode when the unit is used in another mode.

(10) START STOP Start/Stop key (Symbolized here as S/S)

Controls start/stop of stopwatch.

(11) 0 – 9, • PM Numeral and decimal point keys

Enter numerals. For decimal places, use the • key in its sequence. The • PM key also operates the "PM" sign in time setting.
When these keys are pressed with the switch at "♪", music can be played.

(12) +, −, ×, ÷, = Function command and equal keys

Perform the four basic calculations. An incorrect function command (+, −, ×, ÷) is automatically cleared by pressing the correct function command key.
The = key obtains an answer.
The = key also activates and deactivates alternately the hourly time signal when pressed after the AC key with the switch at "SET".

(13) M+ (M−) Memory plus (minus) key

Adds (subtracts) the displayed number to (from) the memory.
Obtains the answer in four functions and automatically accumulates it into the memory positively (negatively).

(14) MRC Memory recall/Memory clear key

Recalls the contents of the memory without clearing. It also clears them when pressed twice successively.

(15) % Percent key

Performs percentage calculations.

(16) √ Square root key

Extracts the square root of the displayed number.

(17) C Clear key

Clears entry for correction; also releases overflow or error check.

(18) AC All clear key

Clears all calculating registers except the memory; also releases overflow or error check.
Resets stopwatch timing.

(19) PO All reset button

After replacing batteries, push this button.

2 CARE OF YOUR UNIT

* Since the unit contains precise electronic components, never attempt to disassemble it.
* Be careful not to drop the unit or mishandle it.
  Avoid operating the keys roughly.
* Avoid using the unit in extreme temperatures (below 32°F or 0°C, or above 104°F or 40°C). Also protect the unit from extremely dusty or humid conditions.
* Never use volatile fluid such as lacquer thinner, benzine, etc. when cleaning the unit.

[3] BATTERY MAINTENANCE

Two alkaline-manganese batteries (Type: LR1130) give approximately 6 months continuous operation (approximately 10 months on type SR1130 (G-10) silver oxide batteries).
When battery power decreases, the whole display darkens. Batteries should then be renewed.

Replacement of batteries:

1) Open the back panel of the unit by loosening the screws with a ⊕ screwdriver.
   Never touch the inside of the unit except the battery compartment.
2) Remove dead batteries.
3) Insert new batteries with the plus terminal (flat side) on top.
4) Replace the back panel. Screw carefully.
5) Keep pressing the "P" button on the back of the unit more than one second and confirm that "0" (zero) is displayed. If not, repeat the above operation.

* Before inserting new batteries, be sure to thoroughly wipe them off with a dry cloth to maintain good contacts.

* Be sure to replace ***both*** batteries.
* Do not leave dead batteries in the battery box as they may cause malfunctions.
* Remove the batteries when not using for an extended period.
* It is recommended that batteries be replaced once a year to prevent the chance of malfunctions due to battery leakage.
* Removing the batteries clears all preset data.

Note:

a) Avoid unnecessary pressing of numerical keys or the ⊡ key while in the "♪" mode, as continual usage of sound will shorten battery life. (To save battery life, the duration of a note is limited to about 1 to 2 minutes with one press.)

b) Original batteries supplied with the unit are estimated to last 6 months from the date of installment at the factory, not from the date of purchase.

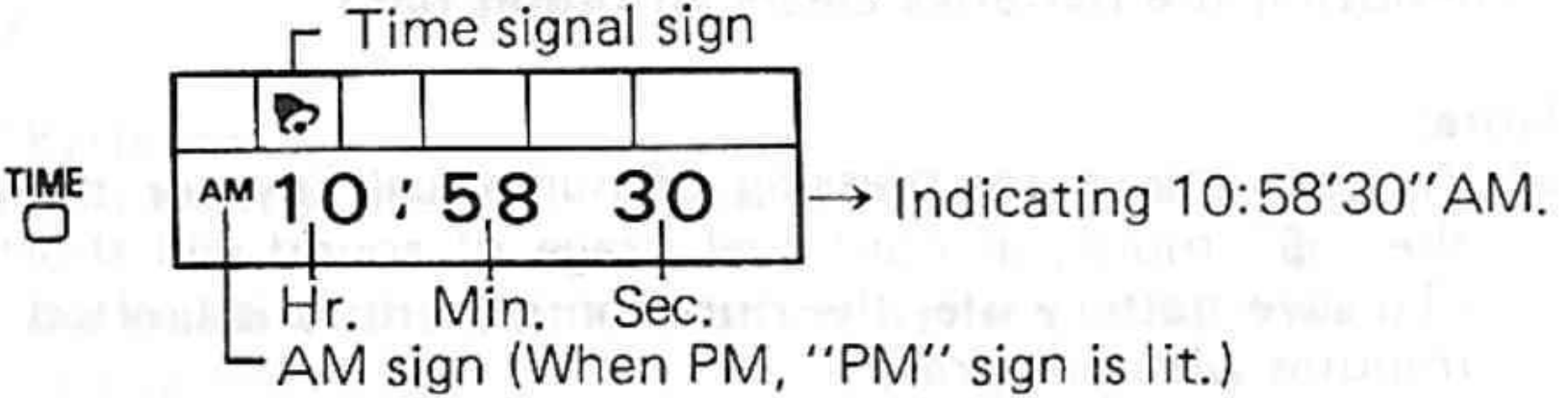
4 USAGE

4-1 CLOCK

■ Read-out example

* With the switch at "TIME", time display is made continuously.

OPERATION	READ-OUT



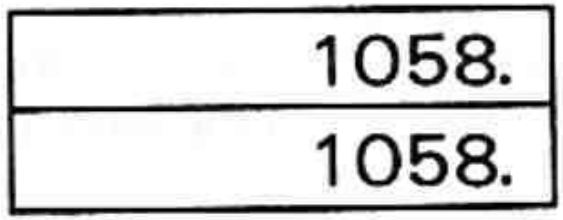
■ Setting time

Ex.) Setting 10:58'PM

OPERATION	READ-OUT

Switch → Except to "TIME"

AC 1058



PM (If PM is not pressed AM is entered.)

Now press ADJ/SET with a pointed object on a time signal from radio, telephone or other correct time indicator.

(Time signal of 10:58'PM) ADJ/SET → PM 10:58 00

Note:

* When setting 3:08'AM or 3:00'PM, press AC 3 0 8 ADJ/SET or AC 3 0 0 PM ADJ/SET

■ **Readjusting an error up to ±30 seconds**

* Gains or losses within 30 seconds can be corrected by pressing ADJ/SET to match a time signal.
* The following operation can be made with the switch at any position.

Ex.) Readjusting a gain (when second display is 01 to 29.)

OPERATION	READ-OUT
(Time signal of 10:58'PM) ADJ/SET	PM 10:58 18 → PM 10:58 00 (18 second gain is adjusted to zero.)

Ex.) Readjusting a loss (when second display is 30 to 59.)

OPERATION	READ-OUT
	PM 10:58 35
(Time signal of 10:59'PM) ADJ/SET ○	PM 10:59 00 → (25 second loss is adjusted to zero.)

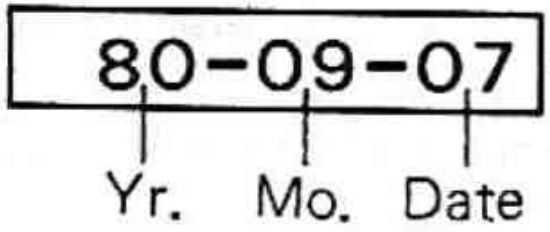
■ **Hourly time signal**

* The hourly time signal can be set and deactivated by pressing AC, alternately, with the switch at "SET".
* When set, "🔔" will appear on the display and the time signal will be given every hour on the hour. At noon the "Big Ben" type tune will be given.

4-2 CALENDAR

* Since the calendar is permanently programmed (from January 1, 1910 to December 31, 1999), no date adjustment is required for irregular months or leap years. After replacing batteries, however, the present date must be set.

■ **Read-out example**

OPERATION	READ-OUT
a) AC DATE b) DATE (while time display) b') When the DATE key is released the display reconverts to regular time.	 → Indicating September 7, 1980.

■ **Setting calendar**

Ex.) Setting September 7, 1980

OPERATION	READ-OUT
Switch → Except to "TIME"	
AC 800907 ADJ/SET	80-09-07

* If the calendar display is left for approximately 6 minutes, the display reverts to regular time.

4-3 ALARM

* Two alarm times can be preset.

Alarm-1: 7 different melodies, a fixed melody or electronic buzzer. (You can enjoy a different melody everyday or select a melody for repeat everyday.)

Alarm-2: A fixed melody or electronic buzzer.

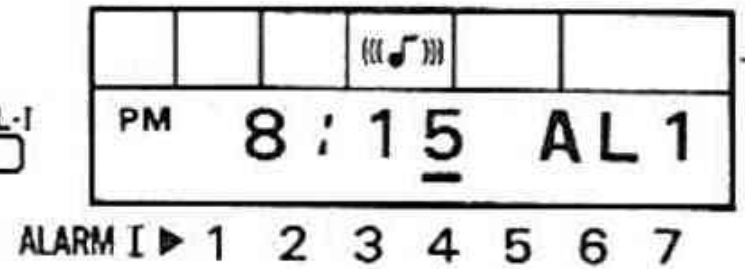
	Melody No.	Melody
Alarm-1	1	Whistler and his dog (Prior)
	2	"La Primavera" (Le Quattro Stagioni) (Antonio Vivaldi)
	3	Menuet de L'Arlésienne (George Bizet)
	4	Holdilidi (Swiss folk song)
	5	Gavotte (F.J. Gossec)
	6	Beautiful dreamer (S.C. Foster)
	7	Picnic (British folk song)
	0	Electronic buzzer (sounds for 30 seconds)
Alarm-2		German folk song
	#	Electronic buzzer (sounds for 30 seconds)

Ex. 1) Setting alarm-1 to 8:15'PM without selecting a melody.

OPERATION	READ-OUT

Switch → "SET"

AC 815 (PM) AL-I



The "♪" sign indicates that alarm-1 is set.

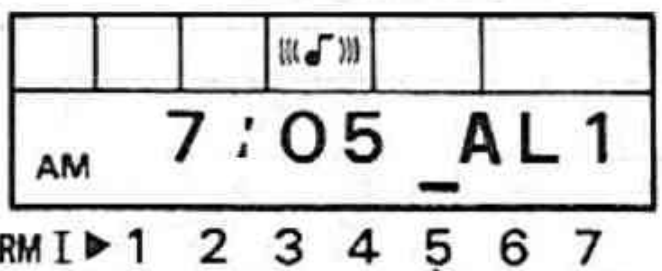
Indicates the No. 4 melody is automatically set.

Ex. 2) Setting alarm-1 to 7:05'AM by selecting the No. 5 melody(Gavotte).

OPERATION	READ-OUT

Switch → "SET"

AC 705 # 5 AL-I



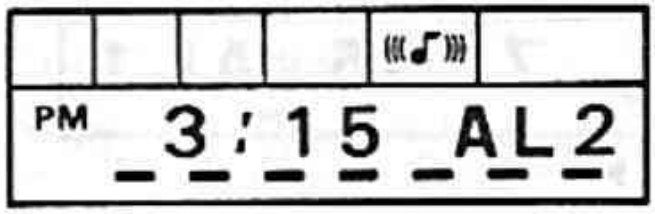
Designation of melody No.
(To select the electronic buzzer sound, press # 0.)

Indicates the No. 5 melody is set.
(When selecting the electronic buzzer sound, no dot appears.)

* When no melody is selected, the one indicated by a dot while in regular time display, is automatically set. The melody changes everyday, with a dot, while in regular time display, indicating which melody is to be played.
* When required, a melody can be selected that will be played everyday.

Note:
The dot shown while in calendar display has nothing to do with the melody No.
During the process of selecting a melody, the dot shown while in regular time display, has nothing to do with the melody No.

Ex. 3) Setting alarm-2 to 3:15'PM (Melody)

OPERATION	READ-OUT
Switch → "SET"	 The "♪" sign indicates that alarm-2 is set.

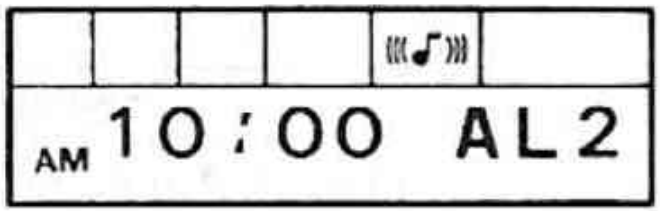
* The same melody is played everyday.

Ex. 4) Setting alarm-2 to 10:00'AM (Electronic buzzer)

OPERATION	READ-OUT

Switch → "SET"

AC 1000 # AL-II



Designation of electronic buzzer sound

* To stop the melody or buzzer, press AL-I, AL-II, DM-I, DM-II or DATE.
* After setting an alarm time, move the switch to "CAL", "♪" or "TIME" position.
* To confirm the pre-set alarm time and melody (or buzzer), press AL-I or AL-II after the AC key. In this case, when the switch is at the "♪" position, the pre-set melody is played.
* The pre-set alarm time can be changed by entering a new alarm setting. To clear each alarm setting, set the switch to "SET" and erase the "♪" sign by pressing AL-I or AL-II while each pre-set alarm time is displayed.
* If an alarm display is left for approximately 6 minutes, the display reverts to regular time.

4-4 DATE MEMORY

* Setting date memory-1 and date memory-2.
* Two selectable melodies are pre-programmed in date memory-2.

	Melody
Date memory-1	Happy birthday (M. Hill)
Date memory-2	Wedding march (Mendelssohn) or "Trinklied"(German folk song)

Ex. 1) Setting February 3 to date memory-1 (Assuming it is your daughter's birthday)

OPERATION	READ-OUT
Switch → "SET"	
AC 203 DM-I	1 02-03

Ex. 2) Setting October 10 to date memory-2 by selecting the melody "Trinklied"

OPERATION	READ-OUT
Switch → "SET"	
AC 1010 # DM-II	2. 10-10

When setting "Wedding march", pressing of # is not required.

A dot indicates "Trinklied" is set.

* On the arrival of the pre-set date, the "DT" blinks for 24 hours on the display and the pre-set melody is played 5 times throughout the morning instead of hourly time signal: 6:00, 7:00, 8:00, 9:00 and noon (The melody won't be played when the "🔔" sign is not lit on the display).
* The pre-set melody can be played by pressing DATE on the pre-set date.
* To stop the melody, press AL-I, AL-II, DM-I, DM-II or DATE.
* After setting a date memory, move the switch to "CAL", "𝄞" or "TIME" position.

* To confirm the pre-set date, press DM-I or DM-II after the AC key.
  In this case, when the switch is at the "♪" position, the melody is played.
* The pre-set date can be changed by making a new date setting. To clear date setting, press AC DM-I or AC DM-II with the switch at "SET".
* If a date memory display is left for approximately 6 minutes, the display reverts to regular time.

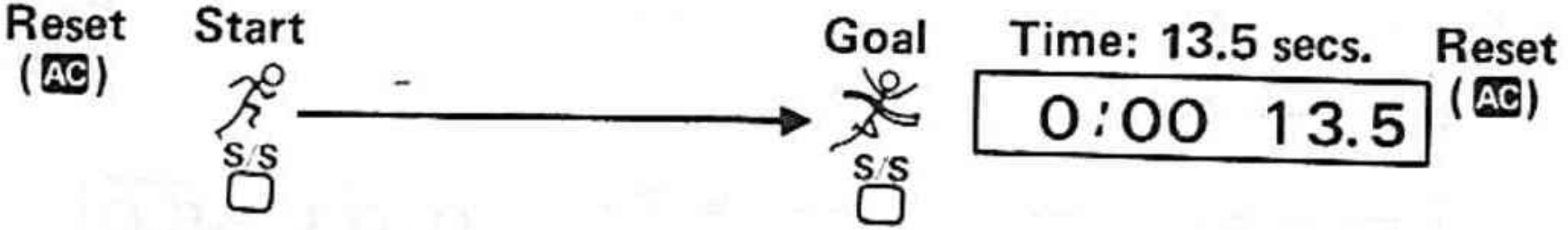
■ A melody for Christmas

December 24 and 25 are automatically pre-set and "Jingle bells" (J.S. Pierpont) is played 5 times throughout the morning of the two days instead of hourly time signal: 6:00, 7:00, 8:00, 9:00 and noon (The melody won't be played when the "🔔" sign is not lit on the display).
"Jingle bells" can be played by pressing DATE on these two days.

4-5 STOPWATCH

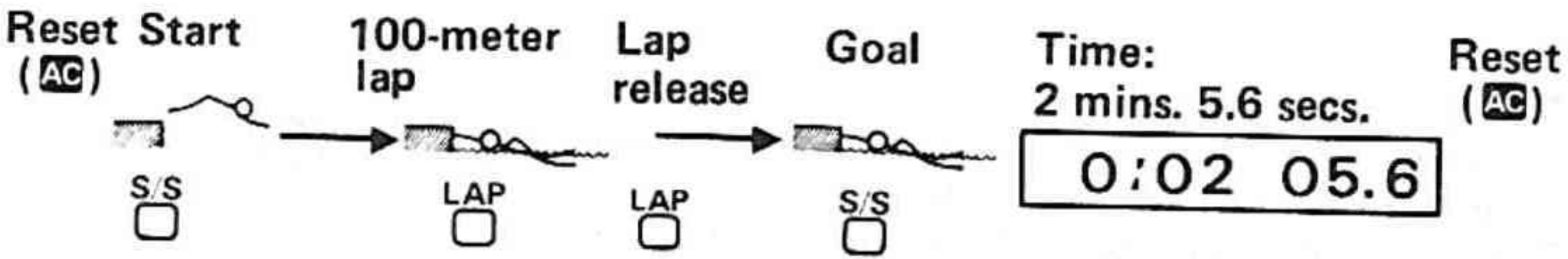
Normal, net and lap timings are possible up to 9 hours 59 minutes and 59.9 seconds in 1/10th of a second steps. The moment the time reaches 10 hours, the stopwatch reverts to "0" and restarts timing.

Ex. 1) Normal time measurement (100-meter track race)



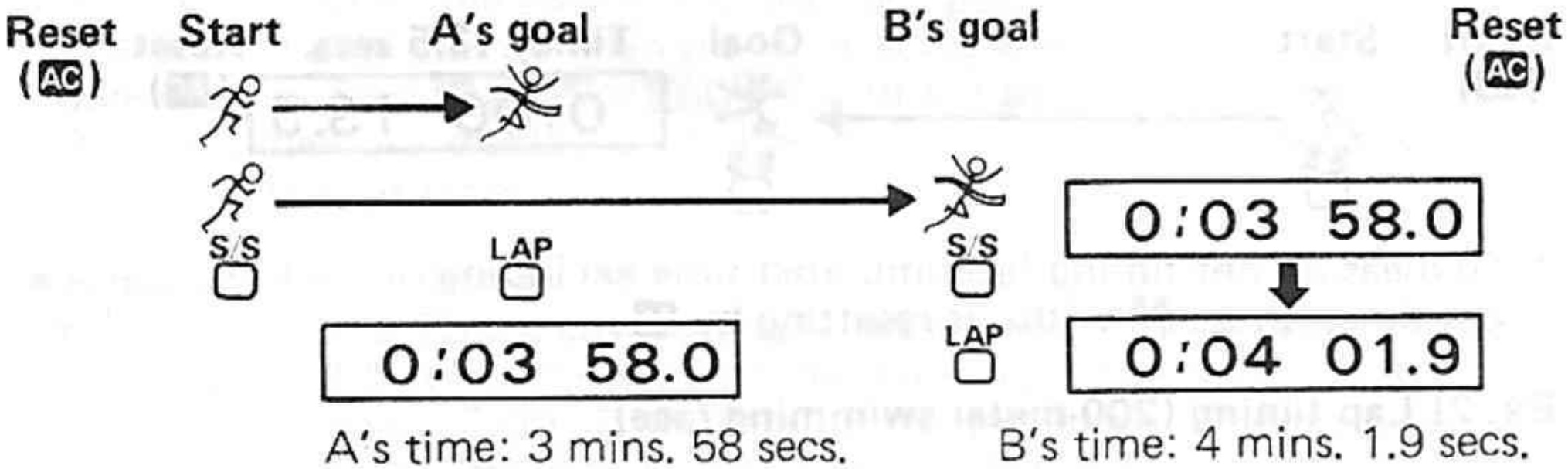
* To measure net timing (accumulated time excluding loss time), press S/S without resetting by AC.

Ex. 2) Lap timing (200-meter swimming race)



(Though the time display is stopped, timing continues in a secondary circuit.)

Ex. 3) Measuring time of two runners in 1,500-meter track race



A's time: 3 mins. 58 secs.

B's time: 4 mins. 1.9 secs.

* While timing, another function (e.g. calculation) can be performed. Then continuous timing can be retrieved by pressing AC LAP: if S/S is pressed instead of LAP, timing restarts from "0".
* A signal is given every 10 minutes while stopwatch timing is displayed (except display of lap time).

4-6 MELODY FUNCTIONS

There are various pre-programmed melodies for alarm and date memories. They can be enjoyed as follows.

Switch → "𝄞"

- **Alarm-1**
  The pre-set melody is played by pressing AC AL-I and a subsequent press of # performs melody playing from No. 1 to No. 7 in order. Pressing of # while a melody is playing changes it to the next one.

- **Alarm-2**
  "German folk song" is played by pressing AC AL-II and it is played repeatedly with each subsequent press of #.

- **Date memory-1**
  "Happy birthday" is played by pressing AC DM-I and it is played repeatedly with each subsequent press of #.

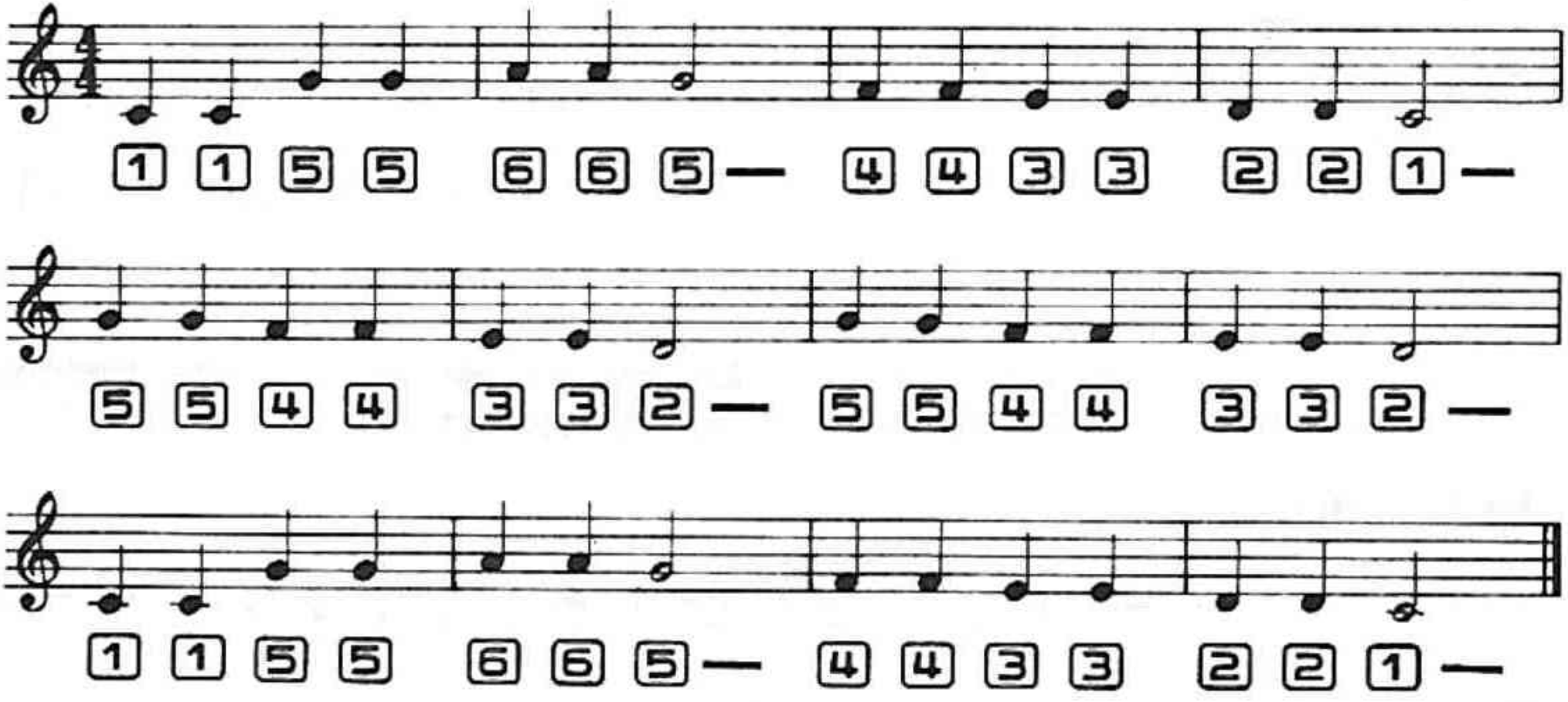
- **Date memory-2**
  "Wedding march" is played by pressing AC DM-II, and "Trinklied" and "Wedding march" are played with each subsequent press of #.

- "Jingle bells" is played after regular hourly and noon-time signals by pressing AC #.

- **Manual playing**
  By pressing numeral keys, including ⊡, according to the following musical scales a melody can be played.

* The note sounds for the duration of key pressing (up to 1–2 minutes), so the length of sound, long or short, can be controlled freely.

Ex.) Playing the song



4-7 CALCULATION FUNCTION

* Set the switch to "CAL" or "¢".
* Press the AC key, prior to starting calculations.
* Calculations do not affect the clock, calendar, alarm, date memory or stopwatch.
* If another function is activated while calculating, calculation is cleared except the contents of the memory.
* When not calculating for approximately 6 minutes the display reverts to regular time.
* When you press any of these keys: =, M+, M-, MRC, %, √, the melody and the displayed numeral result come out together.

Ex.) Switch → "¢"

12345678 × 1 = | 12345678. |

* Overflow is indicated by the "E" sign and stops further calculations.

Overflow occurs:

a) When the integer part of an answer, whether intermediate or final, exceeds 8 digits (7 digits for negatives). However, the significant digits of the answer is given and the decimal position is 8 digits to the right.

b) When the integer part of an accumulated total in the memory exceeds 8 digits (7 digits for negatives).
c) When a negative number is extracted. However, the answer is given as an absolute value.

To release the overflow check, press the AC or C key.
AC clears the entire machine except the memory.
C clears only the "E" sign, and the displayed approximate number can be utilized in subsequent calculations.

EXAMPLE	OPERATION	READ-OUT
1234567×10000 =12345670000	1234567 ⊠ 10000 ⊟	123.4567E
		Answer reads: 12345670000
	(To start a new calculation) AC	0.
	1234567 ⊠ 10000 ⊟	123.4567E
	C	123.45670
	⊠ 10 ⊟	1234.567

Memory protection:
The content of the memory is protected against overflow, and the accumulated total is recalled by the MRC key after the overflow check is released by the AC or C key.

EXAMPLE	OPERATION	READ-OUT
99999999+1	MRC MRC 99999999 M+	M 99999999.
=100000000	1 M+	M E.
	AC	M 0.
	MRC	M 99999999.

5 SPECIFICATIONS

■ CLOCK

Accuracy: Within ±15 secs. per month (at 25°C or 77°F).
Read-out: 12-hour system digital display of hour, minute, second and AM/PM.
Adjustment: Readjusting an error within ±30 seconds at one touch.
Hourly time signal: Hourly time signal is given every hour on the hour.

■ CALENDAR

Programmed range: January 1, 1910 to December 31, 1999.
Read-out: Year, month and date.

■ ALARM

Alarm-1: Electronic buzzer (30 secs.) or 7 different melodies.
Alarm-2: Electronic buzzer (30 secs.) or a fixed melody.

■ DATE MEMORY

Date memory-1: A fixed melody.
Date memory-2: Two selectable melodies.
"Jingle bells" on Dec. 24 and 25.

■ STOPWATCH

Measuring capacity: Up to 9 hours, 59 minutes, 59 seconds and 9/10ths of a second.

Measuring step: 1/10th of a second.
Measuring type: Normal, net and lap timings.

■ MUSICAL FUNCTION

Manual or pre-programmed melody playing.

■ CALCULATOR

Abilities:
Four basic calculations, constants for +/—/x/÷, automatic accumulation in four calculations, direct access to the memory, percentage calculations including add-ons/discounts and mark-ups, square roots and various kinds of practical calculations.

Capacity: 8 digits including minus (—) sign.
Read-out: Liquid crystal display, suppressing unnecessary 0's (zeros).
Decimal point system: Full-floating with underflow.
Overflow check: Indicated by the "E" sign, locking the calculator.

■ MAIN COMPONENT:

One chip C-MOS-LSI

■ **POWER CONSUMPTION:**
0.012W

■ **POWER SOURCE:**
Two alkaline-manganese batteries (Type: LR1130).
Two silver oxide batteries (Type: SR1130 (G-10), UCC389, 10L122 or RW-49).
The unit gives approximately 6 months continuous operation on type LR1130 (approximately 10 months on type SR1130 (G-10)).

■ **AMBIENT TEMPERATURE RANGE:**
0°C – 40°C (32°F – 104°F)

■ **DIMENSIONS:**
5.5H x 63W x 115mmD (7/32"H x 2-1/2"W x 4-1/2"D)

■ **WEIGHT:**
73g (2.6oz) including batteries.

CALCULATION EXAMPLES
EJEMPLOS DE CALCULOS

* Set the switch to "CAL" or "¢" when calculating.
  Be sure to press AC prior to starting calculations.
* Para calcular, coloque el conmutador en "CAL" o "¢".
  No olvidar de tocar el botón AC antes de comenzar con los cálculos. En los ejemplos de operaciones, se usa un punto para indicar las fracciones decimales y una coma para la separación coda tres dígitos.

EXAMPLE EJEMPLO	OPERATION OPERACION	READ-OUT LECTURA

Basic calculations
Cálculos básicos

$(12+3)\times89\div7=190.71428$

OPERATION OPERACION	READ-OUT LECTURA
12 [+]	12.
3 [×]	15.
89 [÷]	1335.
7 [=]	190.71428

* To perform a problem commencing with a negative figure, press [AC] [−] ENTRY in sequence.
* Para realizar un problema que comience con una cifra negativa, presionar [AC] [−] ENTRADA en esa secuencia.

$(-8)\times5\div4=-10$

OPERATION OPERACION	READ-OUT LECTURA
[AC] [−] 8 [×] 5 [÷] 4 [=]	−10.

Constant calculations
Cálculos constantes

3+1.2=4.2	1 ⊡ 2 ⊞ ⊞ 3 ⊟	⊞ 4.2
6+1.2=7.2	6 ⊟	⊞ 7.2
4−5.6=−1.6	5 ⊡ 6 ⊟ ⊟ 4 ⊟	⊟ −1.6
9−5.6=3.4	9 ⊟	⊟ 3.4
2.3×12=27.6	12 ⊠ ⊠ 2 ⊡ 3 ⊟	⊠ 27.6
4.5×12=54	4 ⊡ 5 ⊟	⊠ 54.
23÷4=5.75	4 ⊞ ⊞ 23 ⊟	⊞ 5.75
56÷4=14	56 ⊟	⊞ 14.

$2.5^2=6.25$ 2 ⊡ 5 × × =

$2.5^3=15.625$ =

$2.5^4=39.0625$ =

× 6.25
× 15.625
× 39.0625

$\frac{1}{4}=0.25$ 4 ÷ ÷ 1 =

$\frac{1}{4^2}=0.0625$ =

÷ 0.25
÷ 0.0625

$\frac{26}{12+45}=0.4561403$ 12 + 45 ÷ ÷ 26 =

÷ 0.4561403

Square roots
Raíz cuadrada

* The √ key extracts the square root of the number displayed up to 8 digits.
* La tecla √ extrae la raíz cuadrada de un número presentado hasta 8 dígitos.

$\sqrt{3} = 1.7320508$	3 √	1.7320508
$\sqrt{2} \times \sqrt{3} + \sqrt{5} = 4.6855575$	2 √ × 3 √ + 5 √ −	4.6855575

Percentage calculations
Cálculos de porcentaje

12% of 1500 12% en 1500	1500 × 12 %	180.
Percentage of 660 against 880 Porcentaje de 660 contra 880	660 − 880 %	75.

15% add-on of 2500
15% de aumento sobre 2500 — 2500 × 15 % + → 2875.

25% discount of 3500
25% de descuento sobre 3500 — 3500 × 25 % − → 2625.

Mark-up

What will the selling price and profit be when the purchasing price of an item is $480 and the profit rate to the selling price is 25%?

Recargos

¿Cuál será el precio de venta y la ganancia cuando el precio de compra de un artículo es de $480 y la relación de ganancia sobre el precio de venta es del 25%?

480 + 25 % → 640.

Selling price:
Precio de venta: $640

(Subsequently)
(Subsecuentemente) − → 160.

Profit:
Ganancia: $160

Increase/decrease
If you made $80 last week and $100 this week, what is the percent increase?

Subas y bajas
Si la semana anterior Ud. ganó $80 y esta semana $100, ¿cuál es el porcentaje de suba?

100 − 80 %

25.
(%)

Memory calculations
Cálculos de memoria

* Be sure to press the MRC key twice successively prior to starting a memory calculation.
  When a number is stored in the memory, the "M" sign appears on the display.
* Asegúrese de presionar la tecla MRC dos veces sucesivas antes de comenzar los cálculos con memoria.
  Cuando se almacena un número en la memoria, el signo "M" aparece en la pantalla.

53+6= 59
23−8= 15
56×2=112
+) 99÷4= 24.75
210.75

MRC MRC 53 + 6 M+
23 − 8 M+
56 × 2 M+
99 ÷ 4 M+
MRC

M	59.
M	15.
M	112.
M	24.75
M	210.75

7+7−7+(2×3)+(2×3)
=19

MRC MRC 7 M+ M+ M− 2 × 3 M+ M+ MRC

M	19.

$$\begin{array}{r} 12\underline{\times 3}= 36 \\ -)\ 45\underline{\times 3}=135 \\ 78\underline{\times 3}=234 \\ \hline 135 \end{array}$$

[MRC] [MRC] 3 [×] [×] 12 [M+]

45 [M−]

78 [M+]

[MRC]

M	× 36.
M	× 135.
M	× 234.
M	× 135.

$$\frac{85+26}{43-18}=4.44$$

[MRC] [MRC] 43 [−] 18 [M+]

85 [+] 26 [÷] [MRC] [=]

M	25.
M	4.44

Invoicing/Facturación

Article Artículo	Quantity Cantidad	Unit price Precio unitario	Discount Descuento	Amount Monto
A	250	$56	5%	$13,300.00
B	380	96	8	33,561.60
C	420	73	7	28,513.80
Total				75,375.40
5% sales tax/5% de impuesto a la venta				3,768.77
Grand total/Gran total				$79,144.17

MRC MRC 250 × 56 × 5 % − M+	M	13300.
380 × 96 × 8 % − M+	M	33561.6
420 × 73 × 7 % − M+	M	28513.8
MRC	M	75375.4
× 5 %	M	3768.77
+	M	79144.17

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